

Listing of Claims:

1. (Currently Amended) An image reading apparatus comprising:

a plurality of image sensors having different spectral characteristics from one another;

5 a layered image generation section ~~for generating which generates~~ a plurality of pieces of layered image-data based on the basis of an output from the plurality of image sensors obtained by reading a document as an object to be read;

10 a comparison section ~~for comparing which:~~ (i) ~~compares~~ a threshold of each of the plurality of pieces of layered image data against a pixel value of each of the plurality of pieces of layered image data, the threshold being predetermined corresponding to each of the plurality of pieces of layered image data, and ~~for judging~~ (ii) judges existence of a document image
15 on each pixel;

an estimated document area determination section ~~for determining which determines~~ an estimated document area of each of the plurality of pieces of layered image data based on the basis of a result of judging the existence by an output from the
20 comparison section;

a document area detection section ~~for detecting which detects~~ a document area based on the basis of the estimated

document area of each of the plurality of pieces of layered image data; and

25 a document reading section ~~for reading a~~ which reads the document based on ~~the basis of~~ the document area detected by the document area detection section.

2. (Original) The apparatus of claim 1, wherein the document area detection section detects an area included in any one of the estimated document area of each of the plurality of pieces of layered image data as the document area.

3. (Original) The apparatus of claim 1, wherein the plurality of image sensors include a color image sensor comprising three sensors having spectral sensitivity which respectively peaks at R (red), G (green) and B (blue).

4. (Original) The apparatus of claim 1, wherein the threshold of each of the plurality of pieces of layered image data is changeable.

5. (Currently Amended) The apparatus of claim 1, further comprising:

a platen on which the document is placed;

a platen cover openably mounted on the platen; and

5 a platen cover open detection section for detecting an
opened state of the platen cover, wherein an operation of
detecting the document by the document area detection section is
performed based on ~~the basis of~~ a signal output from the platen
cover open detection section.

6. (Currently Amended) The apparatus of claim 5, further
comprising an automatic threshold setting section for setting the
threshold of each of the plurality of pieces of layered image
data based on ~~the basis of~~ a signal output from the plurality of
5 image sensors in a state that the platen cover open detection
section detects the opened state of the platen cover and the
document is not placed on the platen.

7. (Currently Amended) The apparatus of claim 1, wherein
the estimated document area determination section determines an
effective image area of each of a plurality of scan line lines
based on ~~the basis of~~ information regarding an area where not
5 less than a predetermined number of pixels which are judged as
~~the pixel on which~~ having the document image ~~exists~~ existing
therein by the comparison section are continuously lined up in
each scan line, and determines a smallest rectangular area that
includes all the effective image area of each scan line as the
10 estimated document area.

8. (Currently Amended) The apparatus of claim 1, wherein the estimated document area determination section determines an effective image area of each of a plurality of scan line lines based on the basis of information regarding an area where not less than a predetermined number of pixels which are judged as the pixel on which having the document image ~~exists~~ existing therein by the comparison section are continuously lined up in each scan line, and determines an area included in both ~~an~~ the effective area in a previous line and ~~an~~ the effective area in a current line as the estimated document area of the current line.

9. (Currently Amended) An image formation apparatus comprising:

a plurality of image sensors having different spectral characteristics from one another;

a layered image generation section ~~for generating which~~ generates a plurality of pieces of layered image-data based on the basis of an output from the plurality of image sensors obtained by reading a document as an object to be read;

a comparison section ~~for comparing which:~~ (i) compares a threshold of each of the plurality of pieces of layered image data against a pixel value of each of the plurality of pieces of layered image data, the threshold being predetermined corresponding to each of the plurality of pieces of layered image

data, and ~~for judging~~ (ii) judges existence of a document image
15 on each pixel;

an estimated document area determination section ~~for~~
~~determining~~ which determines an estimated document area of each
of the plurality of pieces of layered image data on the basis of
a result of judging the existence by the comparison section;

20 a document area detection section ~~for detecting~~ which
detects a document area based on ~~the basis of~~ the estimated
document area of each of the plurality of pieces of layered image
data;

25 a document reading section ~~for reading a~~ which reads the
document based on ~~the basis of~~ the document area detected by the
document area detection section; and

an image formation section ~~for forming~~ which forms an image
based on ~~the basis of~~ image data of the document read by the
document reading section.

10. (Currently Amended) A method for detecting a document
area comprising:

5 reading a document as an object to be read using a plurality
of image sensors having different spectral characteristics from
one another;

generating a plurality of pieces of layered image data
based on ~~the basis of~~ an output from ~~a~~ the plurality of image

sensors ~~having different spectral characteristics from one another;~~

10 comparing a threshold of each of the plurality of pieces of layered image data against a pixel value of each of the pieces of layered image data, the threshold being predetermined corresponding to each of the plurality of pieces of layered image data, ~~for~~ and judging existence of ~~an~~ a document image on each
15 pixel;

 determining an estimated document area of each of the plurality of pieces of layered image data based on ~~the basis of~~ a judging result of ~~judging~~ the existence of the document image on each pixel; and

20 detecting a document area based on ~~the basis of~~ the estimated document area of each of the plurality of pieces of layered image data.

11. (Original) The method of claim 10, wherein the plurality of image sensors include a color image sensor comprising three sensors having spectral sensitivity which respectively peaks at R (red), G (green) and B (blue).

12. (Original) The method of claim 10, wherein the threshold of each of the plurality of pieces of layered image data is changeable.

13. (New) An image reading apparatus comprising:

a reading portion including a plurality of image sensors
having different spectral characteristics from one another;

an image data generating portion which generates at least
5 image data of a first color component and image data of a second
color component after reading a document using the reading
portion;

an estimated document area determination portion which
determines a first estimated document area based on a comparison
10 result between each of pixel value of the image data of the first
color component and a first threshold value, and which determines
a second estimated document area based on a comparison result
between each of pixel value of the image data of the second color
component and a second threshold value;

15 a document area detection portion which detects a document
area based on the first estimated document area and the second
estimated document area;

a document reading control portion which controls an
execution of reading the document based on the document area
20 detected by the document area detection portion.

14. (New) An image reading apparatus of claim 13, wherein:
the image data generating portion further generates image
data of a third color component,

the estimated document area determination portion further
5 determines a third estimated document area based on a comparison
result between each of pixel value of the image data of the third
color component and a third threshold value, and

the document area detection portion detects the document
area based on the first estimated document area, the second
10 estimated document area, and the third estimated document area.

15. (New) An image reading apparatus of claim 13, wherein
the document area detection portion detects an OR area between
the first estimated document area and the second estimated
document area as the document area.